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EXAMINER	
ARANCIBIA, MAUREEN GRAMAGLIA	
ART UNIT	PAPER NUMBER
1792	
MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/815,305	HONGO ET AL.	
	Examiner	Art Unit	
	Maureen G. Arancibia	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 April 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *46,48,50-53,55 and 57-65* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *46,48,50-53,55 and 57-65* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. **Claims 46, 48, 51-53, 55, and 58-65 are rejected under 35 U.S.C. 103(a) as obvious over JP 01-274398A to Nakahigashi et al. in view of U.S. Patent 5,614,055 to Fairbairn et al., or alternatively, as obvious over Nakahigashi et al. in view of JP 11-067737A to Koshimizu (the publication of Japanese Patent Application 09-231751) and Fairbairn et al.**

3. **The following rejection refers to the Figures and English Translation of Nakahigashi et al. The following rejection also refers to U.S. Patent 6,162,323, which issued from the U.S. counterpart application to Japanese Patent Application 09-231751, as an English language equivalent to JP 11-067737A to Koshimizu.**

In regards to Claims 46, 51, 53, and 58, Nakahigashi et al. teaches a plasma processing apparatus (Figure 1) for applying a plasma process to a substrate 7, the plasma processing apparatus comprising: a process chamber (the interior of the plasma processing apparatus of Figure 1) in which the substrate 7 is subject to the plasma process; a plasma source (waveguide 3, such as for microwaves; coils 4; Figure 1) that

generates plasma in the process chamber; a gas introducing portion (Figure 1) configured to introduce a gas into the process chamber; and an exhaust outlet 16 (Figure 1) that evacuates the gas from the process chamber; wherein the gas introducing portion includes first and second gas introducing portions configured to supply a first gas and a second gas, wherein each of the first and second gas introducing portions includes an inlet port 14, an outlet port 15, a gas passage 12 connected to the respective inlet and outlet ports, and a plurality of gas nozzles (apertures in respective plates 13) connected to the respective gas passage; and wherein a gas exhaust line is directly connected to each of the respective outlet ports 15 of the respective gas introducing portions. (Figure 1; English Translation, at least pages 5-7)

A review of the English Translation of Nakahigashi et al. indicates that Nakahigashi et al. appears to be silent as to whether each of the exhaust outlet 16 and the two respective outlet ports 15 are connected to respective vacuum devices, as recited in Claims 46 and 51, or whether the two respective outlet ports 15 are connected to bypass lines that connect the outlet ports to a common vacuum device that is connected to exhaust outlet 16, as recited in Claims 53 and 58.

Nevertheless, Examiner argues that it is implicit in the known teachings of Nakahigashi et al. that *either* independent vacuum devices are provided, as recited in Claims 46 and 51, *or* that a common vacuum device is provided, with bypass lines connecting the respective outlet ports 15 to the common vacuum device, as recited in

Claims 53 and 58. In other words, Examiner argues that Nakahigashi et al. anticipates *at least either* Claims 46 and 51 *or* Claims 53 and 58.

In so far as it cannot be determined at this time which of these two claimed arrangements is anticipated by Nakahigashi et al., an alternative rejection of these limitations of the claims is made as being obvious over Nakahigashi et al. in view of Koshimizu.

Koshimizu teaches that the outlet 602 of a processing chamber 134 and an outlet 608 of a gas introducing portion 132 can be connected to a common vacuum device 606, with a bypass line connecting the outlet 608 of the gas introducing portion 132 to the vacuum device (Figure 4; Column 10, Lines 13-30); or alternatively, that the outlet 602 of a processing chamber 134 and an outlet 608 of a gas introducing portion 132 can be connected to independent vacuum devices 902, 904, respectively (Figure 7; Column 12, Lines 30-53).

It would have been obvious to one of ordinary skill in the art to modify the apparatus taught by Nakahigashi et al. to have either a common vacuum device shared by all the outlets, as recited in Claims 53 and 58, or to have independent vacuum devices connected to each of the outlets, as recited in Claims 46 and 51, as taught by Koshimizu. The motivation for providing a common vacuum device, as taught by Koshimizu (Column 10, Lines 61-64), would have been to have an apparatus of decreased cost. The motivation for providing independent vacuum devices, as taught by Koshimizu (Column 11, Lines 8-11), would have been to have the ability for quicker

evacuation of the processing chamber or gas introducing portion, thereby improving the throughput.

Further in regards to Claims 46 and 53, Nakahigashi et al., or alternatively, the combination of Nakahigashi et al. and Koshimizu, do not expressly teach that the gas introducing portions and gas passages are formed in an annular ring shape, the gas nozzles being entirely formed as second gas passages extending within the gas introducing portion.

In regards to Claims 60 and 63, Nakahigashi et al., or alternatively, the combination of Nakahigashi et al. and Koshimizu, do not expressly teach that the plurality of gas nozzles extend radially around a perimeter of the process chamber.

In regards to Claims 61, 62, 64, and 65, Nakahigashi et al. teaches that the gas passage 12 is provided between the inlet and outlet ports and the gas nozzles, as discussed above. (Figure 1)

Nakahigashi et al., or alternatively, the combination of Nakahigashi et al. and Koshimizu, do not expressly teach wherein the gas passage is provided outside an interior of the process chamber, specifically in an inner wall of the process chamber.

Fairbairn et al. teaches that a gas introducing portion with a gas passage 100 is formed in an annular ring shape in an inner wall of a process chamber 102, wherein a plurality of gas nozzles 106 extend from the gas passage 100 radially around a perimeter of the process chamber. The gas nozzles 106 are entirely formed as second gas passages distinct but fluidly connected connected to gas passage 100, and extend

within the gas introducing portion, since the gas introducing portion comprises all of the gas passage 100 and the gas nozzles 106. (Figure 8; Column 9, Lines 20-40)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Nakahigashi et al., or alternatively, the combination of Nakahigashi et al. and Koshimizu, to form the gas introducing portions and gas passages in an annular ring shape, with the gas passage formed in an inner wall of the process chamber, and the plurality of gas nozzles formed as second gas passages and extending within the gas introducing portion extending from the gas passage radially around a perimeter of the process chamber, as taught by Fairbairn et al. The motivation for making such a modification, as taught by Fairbairn et al. (Column 8, Lines 20-40), would have been that forming the gas introducing portion, gas passage, and gas nozzles in such a way solves the problem of overheating of the gas introducing means, since the chamber wall can act as a heat sink for the gas nozzles.

In regards to Claims 48 and 55, Nakahigashi et al. teaches that the gas introducing portion is of a showerhead type having a surface facing the substrate 7 and provided with a plurality of holes. (Figures 1 and 2)

In regards to Claims 52 and 59, Nakahigashi et al. teaches that a diameter of the respective outlet ports 15 is larger than a diameter of the gas nozzles (apertures in respective plates 13). (Figures 1 and 2)

4. Claims 50 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakahigashi et al. in view of Fairbairn et al., or alternatively, over Nakahigashi et al. in view of Koshimizu and Fairbairn et al., as applied to claims

46 and 53 above, and further in view of U.S. Patent Application Publication 2002/0011215 to Tei et al.

The teachings of Nakahigashi et al., Fairbairn et al., and Koshimizu were discussed above.

In regards to Claims 50 and 57, the combination of Nakahigashi et al. and Fairbairn et al., or alternatively, the combination of Nakahigashi et al., Koshimizu, and Fairbairn et al. do not expressly teach that the plasma source includes a flat antenna having a plurality of slits.

Tei et al. teaches that a plasma source includes a flat antenna 111 having a plurality of slits 111S (Figures 1 and 3).

It would have been obvious to one of ordinary skill in the art to modify the plasma source of the combination of Nakahigashi et al. and Fairbairn et al., or alternatively, the combination of Nakahigashi et al., Koshimizu, and Fairbairn et al. to include a flat antenna having a plurality of slits, as taught by Tei et al. The motivation for doing so, as taught by Tei et al. (Paragraphs 76-80), would have been to provide a microwave supply plane to adjust the distribution of microwaves transmitted from the waveguide to the processing chamber, and thereby to adjust the plasma intensity for surface treatment.

Response to Arguments

5. Applicant's arguments filed 29 April 2008 have been fully considered but they are not persuasive.

In regards to applicant's argument that because the nozzles 106 of Fairbairn et al. protrude from the chamber wall, they are not "entirely formed as second gas passages extending within the gas introducing portion," examiner must disagree. During patent examination, the pending claims must be "given the broadest reasonable interpretation consistent with the specification." Applicant always has the opportunity to amend the claims during prosecution, and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified. In the instant case, the gas nozzles 106 of Fairbairn et al. are considered to be "entirely formed as second gas passages," since they are distinct but fluidly connected to gas passage 100, and "to extend within the gas introducing portion," since the gas introducing portion comprises all of the gas passage 100 and the gas nozzles 106, as broadly recited in the claims.

In response to applicant's argument that modifying Nakahigashi et al. to employ the teachings of Fairbairn et al. would render Nakahigashi's ECR reactor unsatisfactory for its intended purpose, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In the instant case, Examiner has identified in the teachings of Fairbairn et al. a motivation for using the gas introducing portion and gas passage of Fairbairn et al., namely that Fairbairn et al. suggests (Column 8, Lines 20-

40) that forming the gas introducing portion, gas passage, and gas nozzles in the way taught by Fairbairn et al. solves the problem of overheating of the gas introducing means, since the chamber wall can act as a heat sink for the gas nozzles. One of ordinary skill in the art would have found it obvious to modify the teachings of Nakahigashi according to the teachings of Fairbairn et al. with a reasonable expectation of success in obtaining this benefit. Meanwhile, the purpose of Nakahigashi to provide shielding and the deposition of contaminants in the process chamber would not be destroyed, since Nakahigashi additionally teaches the provision of "net-like electrodes" (i.e. flat mesh or screen electrodes) to provide the same shielding benefits as the porous plate electrodes 12. (pages 6-7 of the English Translation) It would be well within the skill of one of ordinary skill in the art to make whatever minor modifications necessary to the apparatus of Nakahigashi, such as additionally providing the net-like electrodes, to preserve desirable shielding of the process chamber while obtaining the benefit of preventing overheating of the gas introducing means as taught by Fairbairn et al.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571)272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Maureen G. Arancibia/
Examiner, Art Unit 1792

/Parviz Hassanzadeh/
Supervisory Patent Examiner, Art Unit 1792